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AUTHOR Yano, Masakazu
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ABSTRACT

The purpose of this paper is to clarify the characteristics and current issues of the Japanese educational system by examining the relationship between income distribution and education. This relationship is not simply a one-way effect of education on income distribution, but an interaction between the two. Thus, we must consider the reverse effect of income level and equality on educational demand. This paper examines survey data from studies on education's effect on income distribution. The major focus is placed on an economic analysis of educational systems in Japan rather than an analysis of factors determining income distribution. The structure is as follows: the first section gives a brief description of recent trends in the distribution of income by time series data. The second section discusses possible factors determining these trends and points out the characteristics of income distribution within the framework of human capital theory. The third section is a discussion of measuring the internal rate of return to education and an economic analysis of educational demand. An attempt was made to clarify the economic structure underlying Japan's high level of education. These results were used to point out the need for a more serious consideration of the influence of the income factor on the educational system in addition to examining education's effect on income. The fourth section considers the income redistribution effects of educational finance systems and proposes criteria for sharing the cost of education and the subsidizing of private universities. The final section consists of a summary and conclusions. The role of educational planning in addressing the current debate on educational reform in Japan is discussed. Numerous tables are provided. (BZ)

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Masakazu Yano*

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* Associate Professor-Research Institute for Higher Education at Hiroshima
University-Hiroshima, Japan.

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Personal Income Distribution and Its Influence on Education in Japan

Masakazu Yano*

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* Associate Professor-Research Institute for Higher Education at
Hiroshima University-Hiroshima, Japan

1. Introduction

In comparison with most countries, Japan is considered to have both a relatively equal income distribution and a high level of education. In examining the connection between these two conditions, there is a notion that education in Japan contributes to the equalization of income. Such a relationship, however, is too simple and should be examined more carefully for the following two reasons: 1) Even though there is a high level of educational attainment in Japan, there is not enough clear evidence that Japan is a country which can absolutely claim to have equalized income. 2) Even if income were equalized this cannot be explained only in terms of education.

Education, is of course, one factor used to explain income distribution but complications arise due to the presence of a number of other explanatory factors.

The purpose of this paper is to clarify the characteristics and current issues of the Japanese educational system by examining the

relationship between income distribution and education. This relationship is not simply a one-way effect of education on income distribution, but an interaction between the two. Thus we must consider the reverse effect of income level and equality on educational demand. In this paper we examine survey data from studies on the effect of education on income distribution. The major focus is placed on an economic analysis of educational systems in Japan rather than an analysis of factors determining income distribution. The structure is as follows:

The first section gives a brief description of recent trends in the distribution of income by time series data. The second section discusses possible factors determining these trends and points out the characteristics of income distribution within the framework of human capital theory. The third section is a discussion of measuring the internal rate of return to education and an economic analysis of educational demand. An attempt was made to clarify the economic structure underlying Japan's high level of education. These results were used to point out the need for a more serious consideration of examining the influence of the income factor on the educational system in addition to examining the effect of education on income. The fourth section considers the income redistribution effects of educational finance systems and proposes a criteria for sharing the

cost of education and subsidizing of private universities. The final section consists of a summary and conclusions. In particular the role of educational planning in addressing the current debate on educational reform in Japan was discussed.

2. Income Inequality in Japan

A Reverse Trend Towards Inequality?

The following trends appear when we summarize previous empirical studies on changes in income distribution for the post-WW II era in Japan.

- 1) The 50's was a time of inequality
- 2) The 60' was a time of rapid economic growth and equalization
- 3) Equalization ended early in the 70's with a levelling off or slight reversal.

However, we must use caution in observing trends in income distribution since much data is rendered unclear due to problems in defining 'income', coverage and accuracy of surveys, the measure or standard of inequality. The major available surveys on income distribution at the household level are:

- 1) The Annual Report on the Family Income and Expenditure Survey,
(Bureau of Statistics)
- 2) Employment Status Survey (Bureau of Statistics)

- 3) National Survey of Family Income and Expenditure (Bureau of Statistics)
- 4) Family Savings Survey (Bureau of Statistics)
- 5) Farm Household Economy Survey (Ministry of Agriculture, Forestry and Fisheries)
- 6) Basic Survey for Health and Welfare Administration (Ministry of Welfare)
- 7) The Survey on the Living Conditions of the People (Ministry of Welfare)

Coverage, size, duration and accuracy differs among these surveys making comparisons rather difficult. Generally speaking, the Annual Report (1) is the most popular and is useful in following up longitudinal changes in income distribution. This particular report has the merits of being a continuous time series study and includes detailed income sources and expenditure items, but when it is used in measuring inequality of income some problems arise from missing data. Households engaged in agriculture, and one-person households are not included and there is also an underrepresentation of lower-income households. Moreover, detailed income sources are listed for the category of 'workers' but not for so called 'others' which include such important occupations as individual proprietors and professionals, entrepreneurs etc. Consequently, the Annual Report is a typical such study limited to describing the income

distribution of workers at the multi-person household level.

There are two important studies, Mizoguchi et.al. (1978) and Kaizuka et.al. (1979) which compare income inequality using available data. Mizoguchi's main results are as follows:

(1) The Gini coefficient based on the Employment Status Survey and the Survey on the Living Conditions of the People was found to be larger than the one based on the Annual Report.

(2) But longitudinal trends in the two surveys were found to be similar.

The same results were confirmed by Kaizuka's study as well. In considering these studies, the Annual Report may not be appropriate in measuring the absolute level of income inequality, however, it is the best report available for following up longitudinal trends and for analyzing factors determining inequality.

Figure 1 shows Mizoguchi's analysis of time trends for the Gini coefficient based on data from the Annual Report and the Survey on the Living Conditions of the People. A comparative Gini coefficient done by Kaizuka can be seen in figure 2. Comparing the two figures three common characteristics of the trends mentioned at the beginning of this section appear.

Fig. 1

Fig. 2

In order to show related recent trends, the Gini coefficient based on the Yearly Income Quintile Group from the Annual Report is presented in table 1. Although the coefficient is smaller than in

Table 1

figures 1 and 2, it could be said that this table well reflects recent trends considering the previous studies. The distribution of income equalized in the 60's but moved slightly toward inequality in the middle of the 70's and has not changed appreciably since then.

Can Japan Claim Equal Income Distribution?

Since in previous studies, coverage of the lower and higher income classes was incomplete and since the degree of coverage differs according to survey, significant (2x) differences for the Gini coefficients occur even among Japanese studies; it goes without saying that inter-country comparisons of income inequality would be considerably more difficult.

OECD (1976) made some attempts at improving inter-country comparability and presented the first evaluation of the degree of inequality among 10 countries. Table 2 is one of the results from this study. As can be seen in the table, the share of the first decile is 2.9% for Japan which is the largest share among the 10 countries. The share of the tenth decile is 28.6% which is fifth on the list. The Gini coefficient is 0.335, representing the second most equal country next to Australia.

In addition to the pre-tax income, the OECD study includes a distribution of post-tax income and of post-tax income based on "standardized" household size. Table 3 shows the results of this

Table 2

Table 3

"standardization". The share of the first decile is 2.7% which is somewhat less than in table 2 and in third place below the Netherlands and Germany. Japan's Gini coefficient is 0.335 and its rank of equalization is reduced after standardization. Although smaller than the United States, (0.369) it is number 5 in terms of equality next to the Netherlands, Sweden, Norway and Spain.

Examining table 3 we see a more appropriate picture of inequality than is represented in table 2. Table 3 shows Japan as a country with a normal level of equality in comparison with the other 9 countries represented. The OECD study selected 10 countries which could be reasonably compared after consideration of the availability and comparability of data. The extent of reasonable comparability, however, is not so clear. Ishizaki criticized that Japanese data is not appropriate for such a comparison since it is based on the National Survey of Family Income and Expenditures which excludes agricultural households and has a very low ratio of one-person households. In addition to these faults, he pointed out that transfer and the rate of reporting property income were very understated (Ishizaki, 1983).

Ishizaki provides new measures for Japanese income distribution by using revised transfers and property income based on the Employment Status Survey in order to rectify the shortcomings of the National Survey.

Table 4

These revised measures are shown in Table 4. In the distribution of pre-tax income (corresponding with Table 2) the share of the first decile decreases to only 1.2% which is at the bottom along with Canada and the United States. The share of the second decile is about average for the 10 countries. The Gini coefficient is 0.408 making Japan the most unequal country next to France.

Ishizaki originally estimated the distribution of post-income based on "standardized" household size corresponding with Table 3 and points out that there is less of a degree of equality in Japan than the average out of the 10 countries. In considering these results he arrived at the conclusion that Japan belonged to the unequal countries rather than to the equal countries where it has previously been classified.

Full comparability has not and probably cannot be achieved for numerous statistical, economic and social reasons as mentioned in the OECD report. The estimates by Ishizaki are not strictly comparable either, although they may be appropriate for measuring inequality in Japan. This revision, however, is not necessarily coincident with other countries data. Judging from the OECD and Ishizaki studies, it is not conclusive that there was a greater degree of equality in income distribution in Japan than in the advanced Western nations. As was shown in the previous section, it is difficult to measure the absolute level of inequality for only

one country due to great variance among surveys, so it is all the more risky to make specific conclusions about international comparisons.

3. The Impact of Education on the Distribution of Individual Wages

Factors determining the distribution of income

Mizoguchi relied on the Annual Report for data because it provided rich information for analyzing the factors determining the change of income distribution. His analysis focuses on three points. 1) the changes of income resources classified by regular wages of household heads, temporary wages of household heads (including bonuses), wages of other household members and others 2) the effect of social mobility on income distribution 3) the decomposition of inequality measures by socio-economic background of households classified by age, size of city, number of household members, occupation, industry and size of enterprise.

The main results are as follows:

- 1) The principle factor determining the inequality of the 50's is the inequality in temporary wages (including bonuses) of household head.
- 2) The principle factor determining the equalization in the 60's is the equality of regular wages of household heads. This was a time of

a shortage in the labor force and during this period income differences by age, industry and occupation were reduced by the increase in wages of younger employees and the active mobility of the labor force.

3) The slight inequalization in the 70's was influenced by the economic recession during which the wage differences by industry and occupation slightly increased.

Kaizuka et.al. attempted to analyze in detail factors determining income inequality. Even though this study was limited to age differences at the household level, income differences were shown as varying over time in a similar manner as was seen in the previous section.

Kaizuka developed an econometric model which attempted to explain income differences between age groups for six factors: number of nuclear families, number of working wives, level of educational attainment, rate of return to human capital investment, amount of social security and population dynamics. In this study a simulation model using these factors was carried out with the following results:

1) The principle factor determining the equalization of income between age groups in the 60's was a decrease of rate of return to human capital investment

2) The principle factor determining the slight trend of inequalization at the beginning of the 70's was the increase in number of working wives.

There are various approaches to analyzing factors determining income and these differ according to the interests of the researcher. These differences in approach affect how income is defined and the income unit itself. Precise definition of what constitutes money income i.e. income resources such as entrepreneurial income, property income, current transfer etc., is important for indicating an accurate income distribution. Once this is done the focus of analysis is to clarify the influence of these income resources on total money income. When the household is the income unit under consideration, the income of the members making up the household is an important factor for determining change in income distribution.

Mizoguchi's study is the most comprehensive analysis available which includes the factors of income resources and income of family members. It does not, however, include the effect of education on income distribution. Kaizuka analyzed income distribution within the framework of human capital theory; although his study was limited to differences by age group, he developed a model helpful in

explaining the effects of education and the influences of household members.

Since the main focus of this paper is on the analysis of the effect of education, it is realistic to define income in terms of wages and to set the unit of income at the individual level. For this kind of analysis, there is a longitudinal survey The Census of Wage, which includes detailed data on the relationship between individual workers wages and educational attainment. In consideration of the interests of the present paper, this relationship will be examined in detail based on The Census of Wage. However, caution must be used since these analyses are somewhat different from those dealing with the actual income distribution of whole Japanese households which are based on male workers' wages. Taking into account the fact that the Japanese labor market has large numbers of employees and female worker's jobs are almost all of a supplementary nature, (even though the labor force participation ratio is gradually increasing) this study should fairly well reflect the income distribution in Japan.

Age-Wage Profile and Lifelong Wages According to Education

At first, wage differences by education are shown in Figure 3 which is the age-wage profile. Higher education is related to higher wages and wages gradually increase until the 50-55 year old age range. Here, two Japanese characteristics appearing in these profiles should be taken notice of. One characteristic is that there are no wage differences among younger employees according to educational attainment levels. If the wages of the high-school educated (under 30 years old) were measured on a yardstick as 100, then those persons with up to a Jr. High School education would fall within the limits of 90-106 and those 50-55 years old would be 79. College educated persons under 30 years old would fall within only the 102-104 range but for the college educated in their 50's (50-55) this figure increases to 160.

The second characteristic is that the wage difference between the Primary-Jr. High educated and those with a secondary education is larger than the difference between the secondary educated and college educated.

Fig. 3

In addition to the average wage, lifelong wages according to education can be seen in Table 5. These lifelong wages were estimated by using the age-wage profile from the year of graduation until 65 years old using a zero discount rate. According to the 1980 data from this table, if the Primary-Jr.High educated had wages of 100 then the figure for the secondary educated would be 115, and the Jr. College educated 130 and for the college educated 155.

Longitudinal trends for lifelong wages are shown in Table 5. Table 6 shows the average growth rates divided into two stages, before and after the energy crisis.

Table 5

Table 6

The current average growth rate in wages over a seven year period from 1967 to 1973 was more than 13%. This held for all educational levels. In general higher growth rates are shown for the less highly educated. For example the Primary-Jr. High rate was 15.6% and university 13.7%. Differences in lifelong wages according to education show a tendency toward reduction. However, during the seven years after the energy crisis, the current average growth rate dropped to the 8% level even though slight differences in lifelong wages according to education could be seen e.g. for Primary-Jr. High 7.8% and University 8.1%. After the energy crisis equalization ended and there was a slight tendency towards inequality.

Such a longitudinal trend may be similar to the trends of income seen in section 2. At the same time however, this trend might be partially related to the results of the Kaizuka study where the reduction of the rate of return to investment on education was linked to the income equalization in the 60's.

In examining the Wage Census the wage differences according to size of enterprise and among industries are important as well as the educational differences. Table 7 presents lifelong wages according to size of enterprise and education. In the table higher lifelong wages are clearly seen in the case of larger enterprises, however for different educational levels there is considerable variation according to size of enterprise. The large enterprise groups are within the limits of 135-147 when compared with 100 for the small enterprise groups.

Table 7

Comparing current wage growth rates by size of enterprise and educational level there are some cases where the growth rates of small enterprise groups surpassed larger groups during the period before the energy crisis, but after the energy crisis the growth rate of the large groups surpassed the small ones at all educational levels. This data also reflects longitudinal trends moving from equalization to slight inequalization. Changes in wages for the enterprise groups are an important factor determining the income distribution as can be seen in the results of the Mizoguchi study.

Table 8 shows the wage differentials according to industry. The difference between high and low wage industries matches the difference between size of enterprise although in the case of size of enterprise groups, higher wages at all educational levels are seen for the large groups. However, examining industry according to amount of wages, it becomes clear that higher wage industries depend upon education. For example, the electricity-gas-water industry is the highest for the Primary-Jr. High educated, the financing-insurance industry is the highest for the University educated. Unfortunately, there is no longitudinal trend analysis for lifelong wages according to industry as yet.

Table 8

Impact of Education on Wages

In the previous data we can only see the average wage. There is, however great variance in wages within the same educational, enterprise and industrial groups. Since the Wage Census data is averaged and aggregated for these groups, it is not sufficient for analyzing factors determining the whole wage distribution. Furthermore, panel wage data is also not available, thus the explanatory factors of wages and the impact of education on wages must be shown within the limits of this aggregated data.

The Wage Census provides a detailed breakdown of wage groups according to age and education. Table 9 is a sample of frequencies of the high school and college educated. On the average, higher education is related to higher wages, however there is great variance in amount of wages within the same educational level as can be seen in the table. The first quartile wages of the university educated are only 154 thousand yen which is less than the median wage for the high school educated. Inversely the third quartile wages of the high school educated are more than the median wage of the university educated.

Table 9

In addition to education there is also great variance in wages within the same age groups. The coefficient of variance indicates a larger variance for the higher age groups.

In considering this variance, the influence of education on wages could be seen as rather small. Human capital theory can help to explain this variance. Accordingly, the characteristics of the age-wage profile in Japan will be discussed within the confines of this theory.

Wage function; Chiswick and Mincer (1972), using the human capital model, attempted to theoretically and empirically clarify the variance of wages, explaining it in terms of the amounts of training investment

for schooling and post-schooling. In an empirical analysis of U.S. data he was able to explain 68% of individual differences in the log of income. The direct effect of schooling inequality was only 10%, quite small in comparison with age and employment. Even though the same analysis cannot be done in Japan due to lack of data, we will examine the Mincer type wage function by using the average aggregated wage and show the characteristics of the Japanese age-wage profile and the rate of return to educational investment. A study of this nature was done by Kaizuka(1979). Table 10 shows the regression analysis coefficients which explain the log of hour wage by schooling and work experience. We must use caution in that the R2 cannot explain wage difference since this function is related to the average wage. Three interesting points from these results are indicated as follows:

Table 10

- 1) The rate of return to education (the coefficient of education) rapidly decreased in the 60's. It was 10.7% in 1959 and 6.9% in 1970. This dramatic change is in great contrast to the U.S. for the same period in which there was no appreciable movement, furthermore the rate of return in Japan is smaller than in the U.S..

After this period, the 70's was a time with a levelling off or slight reversal of the rate of return.

- 2) The coefficient of t and t^2 which include the rate of return to

post-schooling investment, show a decrease in the 60's and a levelling off in the 70's as well.

3) Within the framework of human capital theory, this reduction in the rate of return may be considered to contribute to the equalization of wages.

The empirical formula which explains the Gini coefficient in terms of three coefficients as shown in Table 10 is:

$$G = 0.0375 + 0.4745b_1 + 2.8761b_2 + 0.0051|b_3|$$

(1.69) (0.93) (3.28) (2.74)

$$\bar{R}^2 = 0.975 \quad D.W. = 1.773$$

In addition to the above three characteristics a more detailed analysis of the rate of return to education will be shown by using the Wage Census (1980). The wage function is as follows:

$$\ln W = 3.92 + 0.0611S + 0.0644t - 0.0011t^2$$

(69.2) (15.1) (25.7) (-22.7)

$$\bar{R}^2 = 0.96$$

The rate of return to education based on this function is not marginal but average. Accordingly the marginal rate of return to education is measured according to the following procedure:

$$\begin{aligned} \text{I) } \ln W &= 4.59 - 0.053S + 0.0046S^2 \\ &\quad (17.4) \quad (-1.2) \quad (2.6) \\ &\quad + 0.067t - 0.0011t^2 \quad (\bar{R}^2 = 0.97) \\ &\quad (27.6) \quad (-24.4) \end{aligned}$$

$$\begin{aligned} \text{II) } \ln W &= 4.49 + 0.13SEC + 0.27HIGH1 + 0.43HIGH2 \\ &\quad (147.8) \quad (4.7) \quad (9.5) \quad (15.5) \\ &\quad + 0.067t - 0.0011t^2 \quad (\bar{R}^2 = 0.96) \\ &\quad (27.2) \quad (-24.0) \end{aligned}$$

(note) SEC, HIGH1(Jr.College), HIGH2(College) : Dummy Variable

In the first procedure r (marginal rate of return) = -0.053
 0.0092 S with S representing the years of schooling. The marginal
 rate of return to Primary-Jr. High education is 3%, High School
 5.7%, Junior College 7.6% and College 9.4%.
 Even though the s coefficient is not highly significant it is
 important to note that the coefficient of S^2 is positive. Therefore
 the rate of return to education rises with increase in the years of
 schooling; hence the rate of return does not diminish.

"Increasing returns" can be shown from the second method using
 dummy variables as well. But since there is no wage data for
 persons without formal education we cannot estimate the marginal
 rate of return to Primary-Jr. High education using this method.
 "Increasing return" is one important characteristic of Japanese
 higher education. "Diminishing return" however is the rule for most
 other countries including the U.S.. This characteristic is
 considered to have some influence on educational demand in Japan.
 This will be discussed in detail in the following section.

The wage function adding the multiplicative effects of S and t
 is:

$$\begin{aligned} \ln W = & 4.7 - 0.065S + 0.0047S^2 + 0.0004S \times t \\ & (17.2) \quad (-1.46) \quad (2.71) \quad (1.48) \\ & + 0.062t - 0.0011t^2 \quad (\bar{R}^2 = 0.97) \\ & (15.5) \quad (-24.4) \end{aligned}$$

This contrasts with the results in the U.S: (Mincer,1974).

$$\begin{aligned} \ln Y = & 4.87 + 0.255S - 0.029S^2 - 0.0043S \times t \\ & (23.4) \quad (-7.1) \quad (-31.8) \\ & + 0.148t - 0.018t^2 \quad (\bar{R}^2 = 0.309) \\ & (63.7) \quad (-66.2) \end{aligned}$$

Comparing the above formulae it is very interesting to note reverse signs on the S, S² and St coefficients. The differences in the S² is related to whether return increases or diminishes. For Japan the coefficient of tS is positive but for the U.S. negative. Also, for Japan there is a positive multiplicative effect of the years of schooling and work experience on wages. It can be interpreted that with more schooling there is a greater amount of post-schooling investment.

Although several interesting characteristics of Japanese education have been noted, the explanatory power of human capital on the variance of the log of wage cannot be clarified without panel data.

As an alternative approach, the wage function is estimated using frequency data from Table 9 as follows:

$$\begin{aligned} \ln W = & 3.68 + 0.069S + 0.00667t - 0.0011t^2 \quad (\bar{R}^2 = 0.469) \\ & (11.9) \quad (19.9) \quad (542) \end{aligned}$$

This model explains 46.9% of individual variance in the log of wage. The direct contribution of schooling, however is only 3.6%.

According to our survey of monthly income in Tokyo which included workers', individual proprietors' and others' income the explanatory power of this model was reduced to 19.4 as follows.

$$\ln Y = 9.75 + 0.051S + 0.082t - 0.001t^2 \quad (\bar{R}^2 = 0.194)$$

(7.18) (8.61) (-7.87)

(note) t = Age

Analysis of Variance; Another approach to analyze factors determining wage differentials is a technical method using the analysis of variance. There is a study by Tachibanaki(1975) applying this method to the analysis of wages in the Wage Census. The share of the direct effect of 6 variables; sex, occupation (manual, nonmanual), size of enterprise, education, work experience and age is presented in Table 11.

The principle factors determining wage differentials are sex, work experience and age. Sex is the main factor accounting for two-fifths of all variance. The share of education, however, is the smallest accounting for only 1-2% of the variance.

Table 11

4. Economic Structure of Education in Japan

The direct effect of education on wage equalization may be

quite small as was shown in the previous section but this is not to say that educational choice is only slightly affected by wage differentials based on educational attainments. On the contrary, economic influence on educational choice may be considerable, witnessed by the fact that the Japanese educational system is closely related to the economic system.

The purpose of this section is to clarify the influence of wages and employment structure on educational choice. In order to accomplish this 3 points will be considered.

The first is the relationship between lifelong wage and educational choice. Human capital theory proposes a model that people choose careers which maximize their lifelong wages. The characteristics of Japanese education will be discussed based on this model.

The second point is the relationship between education and lifelong wage differentials according to size of enterprise and industry.

The structure of Japanese education will be examined considering the peculiarity of the Japanese employment system which is closely related to the lifelong wage differentials. Finally, in specifying the factors determining educational demand, the analysis of educational demand and policy implications will be discussed.

Educational demand based on lifelong wages

Model of Maximization: There is some difference in lifelong wages due to educational attainment as was previously mentioned. Lifelong wages, however, vary at large from the discount rate, thus the lifelong wages of the college educated are not necessarily the largest because of the discount rate. On the educational demand side, the proposition that individuals choose the educational level which maximizes their lifelong wage in accordance with the discount rate seems a rational judgement. This will be examined related to the optimum amount of educational investment.

There are clearly four possible choices at the time of graduation from Jr. High School; 1) to get a job immediately after graduation 2) to go on to high school 3) to plan to attend Junior College 4) to plan to attend College.

Two questions will be posed here; 1) How are lifelong wages--related to these four choices-- affected by the discount rate? and 2) What is the most efficient choice at a given discount rate? In order to examine these questions the lifelong wage according to the discount rate for the four choices will be shown in Table 12. It can be seen that the fourth choice (College) is the most efficient under a low discount rate but that the ranking of

Table 12

efficiency varies with increase in the discount rate. In comparing each choice, the fourth choice would be the most efficient between a 0 and 7% discount rate. Above 8%, however, it is not the third choice (Jr. College) as would be expected, but the first choice (get a job). Furthermore if this model holds, it would not be logical to choose the second or third choice at any discount rate. Expressing this situation mathematically, there are only two "corner solutions", to get a job or to plan to attend college.

Considering that the optimal educational investment lies in these 2 choices, the relationship between the educational investment (S) and the discount rate (r) can be calculated as in Figure 4. The second best educational choice is indicated in the figure by a dotted line. Ending one's education at high school or going on to Jr. College have become almost involuntary choices from the economic standpoint.

Fig. 4

The reason for such a high level of aspiration for a college education in Japan may be rooted in our economic structure which is characterized by "the College standard". This structure has not appreciably changed during the last two decades.

The results of applying the maximization model to women's educational choice are indicated in Figure 5. Unlike men there

Fig. 5

would be a logical possibility for choosing the Jr. College at certain discount rates. This is substantiated by the fact that Japan's Jr. Colleges are almost entirely occupied by women students.

The paradox of equalization of educational opportunity

The prevailing "college standard" for males is caused by increasing returns in lifelong wages by educational attainment. Theoretically this contradicts the central hypothesis in human capital theory i.e. diminishing returns. This is not to say that the theory per se is wrong, because it hypothesizes diminishing returns for groups with approximately the same earning capability (ability). However, the ability variable is unknown and cannot be dealt with using only observed wage data. Human capital theory shows that the observed return would be increased when those with higher capabilities went on to college while those with less stopped their education at the high school level.

The phenomenon of increasing returns can be confirmed by examining the rates of return to education based on lifelong wages as in Table 13. This table shows the pre-tax and post-tax marginal rate of return comparing private institutions with public institutions where the direct costs (tuition, public subsidies) are different. Examining these results we see a higher rate of return

Table 13

for public institutions. For both types of institutions:

(1) The rate of return to College is highest.

(2) Jr. College is the lowest. Although the rank of Jr. College has changed slightly over the years, the 4-year college has maintained the highest position during the past two decades. For reference, the change in the pre-tax rate of return not including the direct cost can be seen in Table 14.

Table 14

G. Becker's theoretical model explains increasing returns as being due to equal opportunity for higher education. (Becker 1975). Although it is an undeniable fact that due to economic growth there are now fewer able persons being deprived of higher education because of financial barriers, we cannot simply use his theory and empirical data to prove that educational opportunity in Japan is equalized. Here, the Japanese examination system plays an important role. It might be said that economic improvements and the highly selective examination system supports the economic structure of increasing returns.

Consumers of education who are aware of the increasing return of higher education but are uncertain of their real ability to succeed, may have the illusion that they should continue their education as far as their finances permit. As long as ability remains uncertain the only reliable indicator for the consumer is average lifelong wage.

A very high level of educational aspiration and the tightening of screening for admission to higher education are key symptoms of the diploma disease. Equalization of educational opportunity and more weight on "democratic" cognitive testing make this disease more serious. It can be said here that the pathological examination hell in Japan is legitimized by the economic structure.

Hierachical Structure

The second point of view is that size of enterprize and industry influences the close relationship between educational choice and lifelong wage difference. The reason for this close relationship lies in the Japanese employment system.

If there was high mobility among enterprises there would be less significance of joining a particular company just after graduation. However, because of the lifelong employment system in Japan, there is a prevailing idea among students that employment, especially at major companies, determines lifelong wages. As can be seen in Table 15, the percentage of persons (over 25 years of age) who remain in the same company is very high and this share becomes higher in larger companies which pay better wages. Accordingly, it is most useful to be hired by a large company just after graduation in order to insure oneself a good position.

Table 15

It goes without saying that the close relationship between types of institution and employment with a prestigious firm influences educational choice. As Table 16 shows for example, the difference in job opportunity among six types of institution is obvious. Graduates of the most prestigious National I enter large companies while those graduates of the less prestigious Private II and Private III enter smaller ones. Table 16

This difference in job opportunity according to type of institution can be analyzed by examining lifelong wage differences among size of enterprizes. Differences in the rate of return according to the size of enterprize and type of industry are estimated as shown in Table 17. This was done assuming equality for opportunity cost at each educational level. Table 17

The rate of return to College is 7.9% on the average but it becomes 13% for large size companies such as finance and insurance.

On the contrary, there are some small companies with a rate of return under 1%. These differences would certainly influence not only decisions about educational level, but also institutional choice, because these rates of return are closely related to the impact of the educational system on job opportunities.

If we consider only the rates of return according to size of enterprize (Table 17) and link these to the difference in job opportunities (Table 16), we can estimate the expected rates of

return for six types of institutions (Table 18). As can be seen, there is a 2.5% difference between the rate of return for National I and Private III. Differences in rate of return by type of industry are not closely related to institutional hierarchy but rather to the choice of major. The rate of return in manufacturing, for example, was above average in 1970, but it came down to the average level in 1975. Since most engineering departments send their graduates to manufacturing, there were many applicants for engineering departments in 1970, but these decreased in 1975 along with the change in rate of return.

However, the relation between rate of return differences by industry and the choice of major is not so close as the relation between rate of return and type of institution. This is because companies tend not to be particular about the outcome of college education since they plan to develop the employee via company education programs and on the job experience.

Classifying companies according to size can be said to give a picture of the vertical differentiation of an economic system and classification by type of industry gives the horizontal differentiation. The two differentiations form two educational differentiations--the vertical (hierachial) and the horizontal (organization of major). These are reinforced by the lifelong employment system and the difference in rate of return.

In particular, the hierarchy of companies directly influences and structuralizes the hierarchial educational system. This structure becomes another reason for acceleration of the examination rat race.

In this sense the "college standard" becomes the "most prestigious college (Tokyo University) standard".

Determinants of individual demand for higher education

As a final point, empirical analysis of the determinants of individuals demand for higher education in Japan will be examined using the results of my recent study (Yano, 1984a).

The enrollment ratio for higher education rapidly increased from 10.3% in 1960 to 37.8% in 1975. Considering that the rate of return decreased during this time, the main reason for the continued expansion in education is probably because the share of educational cost as a household expenditure decreased at the same time. But this expansion ended after 1975 with a slight decrease or levelling off. Here we could say that the over-aspirations toward education might be cooling out with alternatives to a university education gaining popularity.

The enrollment rate, however, is not appropriate as an indicator of individuals demand. This is because the enrollment rate depends upon the amounts of educational supply and supply has

been consistantly less than demand. Since the applicant rate (ratio of high school graduates wishing to go on to higher education) would be more relevant for analyzing individual demand, a study was carried out using time series (1958-80) data for applicant rates. Naturally, this indicator is influenced by educational supply because of the number of persons deciding not to enter higher education after objectively considering their probability of success. Accordingly, the success rate was included as an explanatory factor in the analysis.

Examining the economic model of individual demand by using regression analysis, the following four main factors were made clear.

- (1) ability to pay; miscellaneous expenditure in household income.
- (2) price of education; tuition fee
- (3) success ratio in examination; no. of entrants vs. no. of applicants
- (4) dummy variable for the energy crisis; 1= 1975-78

This model explains 97-99% of educational demand in the applicant rate as shown in Table 19. From these results the following four reasons explain the non-growth of higher education after 1975.

Table 19

(1) The growth rate in miscellaneous expenditure in household income declined after the energy crises.

(2) Since tuition costs went up at a higher rate than the income growth, applicant rates were reduced. During expansion, on the other hand, the income growth rate is higher than tuition growth.

(3) At the same time, because of the limiting policy of higher education, supply did not expand and there was no increase in the ratio of the number of successful applicants against the total number of applicants. During the expansion period, supply increased and the success rate went up.

(4) Between 1975 and 1978, applicant rates were abnormally high because of the uncertain and unstable economic situation. If we take this exceptional period under consideration, the present applicant rates should not be evaluated as so low.

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In addition to these four factors, 1. the unemployment rate and 2. starting salary differences by educational attainments on individuals demand were examined. Clear results, however, could not be found because of a lack of time series data. Considering that declining high school job opportunities and the increase in salary differences tend to conditionally influence individual demand, further study would be necessary after acquiring the appropriate data.

Reviewing these three points of view, we can see that educational demand and the structure of education in Japan are greatly determined by economic factors.

Educational policy should be addressed with a clear understanding of economic structure. In the conclusion section of this article policy implications will be examined.

5. The Income Redistribution Effects of Educational Finance Systems

Two redistribution effects

The purpose of this section is to examine whether higher educational finance systems are adequate or not from an economic viewpoint and to provide a criterion for cost sharing in education.

The case for public subsidies to education can be justified by reasons of both efficiency and equality. The external benefits of education is a main argument for efficiency. The equality argument is supported due to the fact that resulting lower tuition makes it easier for less affluent students to have greater access to education. Measures of the external benefits of education are very vague and evaluation of these benefits tend to change according to the social context of the times. Consequently, the decisions on subsidies to education which are based on the external benefit proposition are in actuality made according to political power

relations.

Considering the difficulty of evaluating efficiency, the empirical analysis of redistribution effects have focused on the equity problem i.e. whether subsidies were useful in equalizing educational opportunity. If the subsidies to education made higher education more profitable for high income classes rather than lower income classes, then certainly these subsidies could not be justified from the view point of income redistribution. This argument for equity could be called a redistribution between income classes.

There is also however, another important redistribution--from the users of education to the non-users. Users can expect higher lifelong wages after graduation than non users. If the full cost of education were provided by the public these subsidies would become useful only for future higher income classes and not for non-users who will make up the future lower income classes.

Considering this progressive effect of finance, costs corresponding to the private return of education may be shared not by the government but by the user. Because of higher taxation of upper income bracket families, the total lifelong wages of users are not shared. From the principle of cost sharing by the people who benefit from education, the government should share costs corresponding to the incremental tax return to education.

This redistribution between educational levels means guiding the finance system to equalize the two rates of return, social and private. If we consider incremental tax as a part of the external benefits of education, the redistribution between educational levels would become an efficient type of subsidy.

Two redistribution effects; between income classes and between educational levels could be separately examined.

Firstly, the differences of educational opportunity related to the redistribution between income classes will be discussed. As was discussed in the above section, Educational opportunity in Japan may be considered as relatively equalized from the view point of increasing returns to education. However it goes without saying that educational opportunity is not completely equalized. Although household income rapidly increased after WWII, the percent of the household budget going to education has become a heavy burden and it is an undeniable fact that inequality in household income is reflected in the differences in the enrollment ratio.

The degree of inequality of educational opportunity according to family income has been estimated by J. Kikuchi. (J. Kikuchi, 1978).

Although accurate estimates are impossible to obtain due to limited data, one sample of an estimation is shown in Table 20. The following three points could be drawn from his results.

Table 20

(1) There is not a large difference among the first 3 quintiles but the enrollment ratio in the fourth and fifth quintile, especially in the fifth, is considerably high.

(2) The enrollment ratio differences by income quintiles are larger for private universities than for national universities. National universities have relatively low tuition and contribute somewhat towards equalizing educational opportunity.

(3) Enrollment ratios for all family income groups steadily rose between 1961 and 1976. Kikuchi's conclusions were as follows: "Continuous growth of enrollment ratios resulted in society steering clear of involvement in serious conflicts about educational opportunity and not getting to the root of the problem".

Kikuchi examined the between-income class redistribution effect by comparing two percentage distributions; the percentage distribution of student enrollment rates and national-local tax payments by family income class. On the average, the distribution effects of the Japanese educational system are relatively in favor of lower income groups. Although the enrollment ratio for lower income groups is at a low level, paid taxes are also at a low level and the share of paid tax by high income groups is greater than their share of students enrollment.

It is, however, recognized that there are considerable differences in educational opportunity and the Japanese scholarship

system does not necessarily cover these. As many low income class families would go to any length to get access to higher education, there is a necessity for intensifying the between-income-class redistribution effect. In studying this problem there is a severe lack of data for empirical analysis. Kikuchi admitted that his studies reached only tentative conclusions due to the limited data available.

Cost sharing and the rate of return

In this section I will discuss the results from a study (Yano 1984 b) related to my second point, the between-educational level-redistribution effect. In addition, a criterion for sharing the cost of education will be provided.

This redistribution effect can be examined via comparison of the social and private rate of return to education. It can be seen that even in the case where the more highly educated pay more taxes, the social rate of return will be lower than the private one when students pay only a part of the full cost of their education. If the educational subsidy, however, is low and taxes are high, the disparity shifts, resulting in the social rate being above the private one.

In addition to these two rates, there is a third measure, the public rate of return, which relates the cost of education borne by the government to the benefits from incremental taxes.

In comparing the national and private sector there are not only great differences in the unit cost of education but also in the amount of government subsidation. This results in the degree of disparity among the three rates of return differing considerably according to sector. How each rate of return is affected by change in the direct cost of education is measured as shown in Figure 6. When direct unit cost is increased in increments of 100,000 yen, the social and private rate of return decreased from 0.1% to 0.2%. The public rate of return however, rapidly decreases because of the low benefits and small loss in taxes(opportunity cost). Although the curve of the private rate of return is below the curve of the social one, private becomes larger than social when student's share of educational cost is low. The amounts of the share of student's (family), government's (direct cost) and the full cost (social) is shown in Figure 6. Taxation is calculated in 2 ways, income tax only (I) and income tax plus additional taxes (II).

Fig. 6

The three rates of return to University, Jr. College and Jr. High School can be seen in Table 21. In the case of the public sector, the private rate of return is larger than the social one at each educational level. This shows that public subsidies may be in favor of the users of education. In the case of the private sector the degree of disparity among rates of return is small so that the people who benefit from education share the cost of education.

Table 21

Four main findings can be pointed out from these results:

(1) Even though government subsidies to private universities have decreased since 1981 (the proportion of the subsidy in the total current expenditure was 30 percent in 1981 and decreased to 21.5 percent in 1984), the level for 1980 might be considered adequate from the view point of the between-education levels redistribution effect.

(2) Considering other external benefits of education, it is better to increase the subsidation a little more, not to decrease it.

(3) The finance system of public higher education is regressive and it seems to follow that the public higher education system is an instrument for redistributing benefits from non-users to users. It is necessary to reduce the larger gap between the public and private sector for two reasons, because the public sector does not necessarily provide greater external benefits than the private sector and because less affluent students are not necessarily given priority to go on to public universities.

(4) After reconstructing the educational finance system as pointed out above, it is important to inquire into the between-income-class redistribution effect. Although often the argument arises that government subsidies should be cut and these funds transferred to scholarships, this argument is a mistaken one because it neglects the important distinction between the two redistribution effects (between-income and between-education level).

6. Summary and Conclusions

The results from examining the interaction between income distribution and education are summarized as follows:

(1) Japanese income distribution and worker's wage distribution were considerably equalized in the 60's and during this time the wage differences among occupational groups, size of enterprise and educational levels also decreased.

(2) But equalization ended early in the 70's with slight reversal or levelling off which has continued up to date. During the same time period wage differences increased among large vs. small enterprises and the decline in wage differences according to educational levels also ended.

(3) It cannot be conclusively stated that there was a greater degree of equality in income distribution in Japan than in the advanced Western nations. Japan may in fact belong to the unequal nations depending on data and measures.

(4) Within the explanatory framework of human capital theory and using analysis of variance, the direct effect of education on income distribution is seen to be very small. Adding the post-schooling investment to schooling investment, the explanatory power of wage differences based on wage function becomes over 20%.

However, the years of work experience, considered to be important

indicators of post-schooling investment are closely related to the age factor which is reflected in the Japanese seniority system. It is impossible to distinguish between these two factors i.e. the effect of post-schooling investment and the effect of the seniority system on income differences. All things considered, it is not conclusive to say that education in Japan contributes to the equalization of income.

(5) On the other hand educational choice and the structure of the Japanese educational system can be said to be more significantly influenced by income distribution.

(6) Even though the rate of return to Japanese education is less than in the U.S., Japan has the exceptional characteristic of increasing return. Increasing return may have the function of accelerating aspiration for higher education. The democratic policy of equalizing educational opportunities and attaching importance to selection via cognitive testing may result in worsening of the diploma disease, escalation of the examination-war and selective schooling.

(7) There are significant lifelong wage differences according to size of enterprise. These differences are closely related to job opportunity inequality, based on the clearly hierarchical institutional(university) structure perpetuated by the lifelong employment system in Japan.

(8) The expansion of individual demand for higher education ended after the energy crisis and changes in individual demand can, generally be explained by the economic model.

(9) Educational opportunity in Japan is not fully equalized. However, enrollment ratios for all family income groups have steadily risen during the times of expansion which reduced serious conflicts regarding educational opportunity. (Kikuchi, 1978).

(10) As to the between-educational level redistribution effect; if we consider the principle of "those who benefit from education should share its costs" then the current subsidies to private universities may be considered as nearly adequate.

The Japanese educational system is closely linked up to the economy through the characteristics of the Japanese employment system, lifelong employment and the seniority system. However, in Japan there is little work being done in the field of the economics of education and a scarcity of empirical studies useful for making educational policy.

The current active debates on educational reform are too idealistic and too political with little consideration for objective positive analysis based on thorough empirical data. Even the future demand for higher education has not been empirically examined and planning for this demand is not being made in accordance with theoretical and empirical considerations. There is rather, a tendency to avoid the economic model in planning.

Although there are only limited policy implications which can be drawn from the analysis in this paper, the usefulness of an economic analysis of education should be indicated. Finally, noteworthy policy implications from economic analyses of educational demand and the redistributational effect will be summarized as follows:

(1) Tuition reductions and student aid have relatively little influence on enrollment thus the cost of equalizing enrollment according to family income may be very high. The results show that the applicant ratios will decrease 0.2% for each 10,000 yen increase in tuition. Therefore, ideally tuition should be decreased 42,000 yen in order to increase the applicant ratio. Considering enrollment differences according to family income, the cost of equalizing it may become very high.

(2) Since the responsiveness of enrollment demand depends upon the supply situation, the latent demand on higher education may be much higher than the number of applicants. Even if the enrollment ratio remains the same, the number of students varies according to the size of the 18 year-old population. The size of the 18 year old population will increase from 1.72 million in 1983 up to 2.05 million in 1992, then it will decrease and is estimated to reach 1.51 million in the year 2000. In the process of planning for

dealing with this changing population, the problems which must be faced during the period of decrease are recognized as more difficult to handle than those in a period of increase. This is primarily because of the predicted financial crises for private universities. However, according to the analysis shown above, the success rate should go up during the period of decreasing population, causing an increase in enrollment rate. So it is necessary that planning for the post 1993 era should include study on the crisis of management and the growing enrollment rate.

(3) As shown by the analysis of the between-educational level redistribution effect, it would be preferable to slightly increase subsidies to private universities rather than having students (families) bear the full cost of schooling.

The tuition difference between national universities and private ones decreased from 1:7 in 1967 to 1:2 in 1980. There seems to be no use in maintaining this dual structure in Japanese higher education. Reforming inadequate Japanese graduate education should take priority over maintaining a dual university system.

More policy implications from the economic side are very important for Japan's future. G. Williams said that the "technocratic" age of educational planning ended in the 60's and changed to the "political" age of the 70's (G. Williams, 1979). However, in Japan there was no such "technocratic" age and we still remain in an

overly "political" age. It is of great importance for Japan to shift the balance of educational planning from "political" to "technocratic".

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Figure 1 Comparison of Gini Coefficients (Mizoguchi, 1978)

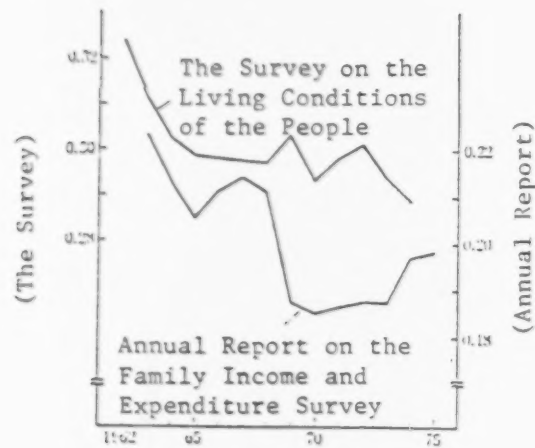
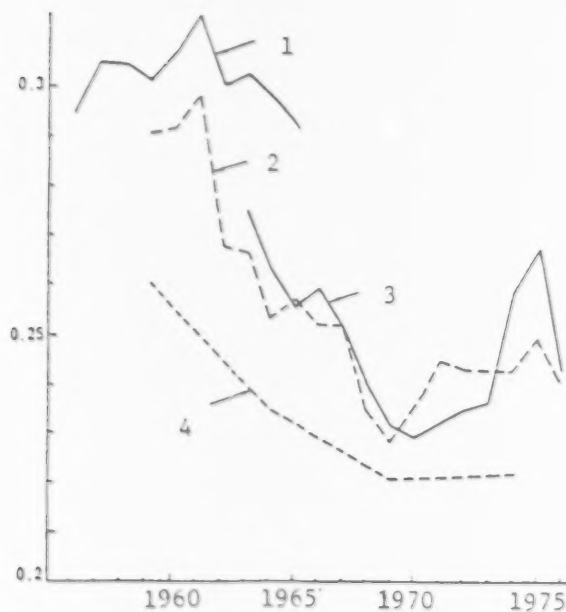


Figure 2 Comparison of Gini Coefficients for Worker's Household (Kaizuka, 1979)



1. Annual Report (Monthly Income)
2. Family Saving Survey
3. Annual Report (Yearly Income)
4. National Survey of Family Income and Expenditure

Table 1

Year	Gini Coefficients	Percentage Share of Income			
			1963	1969	1975 1983
1963	0.215				
64	0.206	Lowest fifth	10.2	11.8	11.5 11.5
65	0.198	Secound	15.0	15.9	15.5 15.5
66	0.202	Third	18.6	18.9	18.8 18.7
67	0.206	Fourth	22.8	22.3	22.8 23.0
68	0.193	Highest	33.3	31.0	31.4 31.3
69	0.179				
70	0.179				
71	0.179				
72	0.180				
73	0.179				
74	0.188				
75	0.188				
76	0.186				
77	0.184				
78	0.188				
79	0.180				
80	0.183				
81	0.187				
82	0.187				
83	0.188				

Table 2 Size Distribution of Pre-tax Income (OECD, 1976)

	Year	1	2	3	4	5	6	7	8	9	10	Gini
Australia	1966-67	2.1	4.5	6.2	7.3	8.3	9.5	10.9	12.5	15.1	23.8	0.312
Canada ^a	1969	1.2	3.1	4.6	6.3	7.9	9.4	11.1	13.1	16.2	27.1	0.382
France	1970	1.5	2.8	4.2	5.7	7.1	8.7	10.4	12.6	16.0	31.0	0.416
Germany ^a	1973	2.5	3.4	4.5	5.6	6.3	8.3	9.9	12.2	15.7	31.1	0.395
Japan	1969	2.9	4.7	5.8	6.8	7.7	8.6	9.7	11.3	13.9	28.6	0.325
Netherlands	1967	2.3	3.6	4.9	6.0	7.3	8.5	9.9	11.7	14.7	31.1	0.325
Norway	1970	1.7	3.2	4.9	6.7	8.2	9.8	11.3	13.3	16.4	24.5	0.354
Sweden ^a	1972	2.0	4.0	5.3	6.1	7.9	9.5	11.2	13.1	16.1	24.4	0.346
United Kingdom ^b	1973	2.1	3.3	5.1	6.9	8.3	9.8	11.2	13.0	15.6	24.7	0.342
United States ^c	1972	1.2	2.6	4.2	5.8	7.5	9.3	11.1	13.4	16.4	23.4	0.404
Average ^d	..	2.0	3.5	5.0	6.3	7.7	9.1	10.7	12.6	15.6	27.3	0.366
Dispersion ^e	..	0.27	0.19	0.13	0.09	0.06	0.06	0.06	0.05	0.05	0.10	
Memorandum items:												
United Kingdom ^f	1972-73	5.8	4.8	5.9	7.5	9.2	11.0	13.1	15.3	26.9		0.373
United States ^g	i) 1971	1.2	3.0	4.6	6.2	7.6	9.1	10.8	12.9	15.8	23.6	0.393
	ii) 1971	1.5	3.4	4.7	6.1	7.5	8.9	10.6	12.7	15.6	29.0	0.328

a) Figures estimated from post-tax distributions by the author.

b) Based on Family Expenditure Survey.

c) Based on Bureau of the Census, Current Population Report.

d) Arithmetic mean.

e) Measured by coefficient of variation.

f) Based on "Blue Book" estimates.

g) Based on (i) money income concept and (ii) family income concept.

Note: For detailed sources, see Appendix I.

Table 3 Size Distribution of Post-tax Income based on "Standardised" Household Size (OECD, 1976)

	Year	1	2	3	4	5	6	7	8	9	10	Gini
Australia	1966-67	1.6	3.2	5.2	6.3	8.3	9.5	11.1	13.0	15.7	25.2	0.354
Canada	1972	1.6	3.6	5.2	6.3	8.3	9.7	11.2	13.0	15.8	24.7	0.342
France	1970	1.4	2.8	4.2	5.5	7.4	8.3	9.7	13.1	16.6	30.5	0.417
Germany	1973	2.3	3.7	4.6	5.7	6.7	8.2	9.8	12.1	15.7	30.6	0.326
Japan	1969	2.7	4.4	5.7	6.7	7.3	9.0	10.1	11.6	14.1	27.3	0.336
Netherlands	1967	3.2	5.9	6.3	7.7	8.3	9.2	10.4	12.1	14.5	21.8	0.264
Norway	1970	2.4	4.2	5.7	7.3	8.7	10.2	11.7	13.0	15.0	21.9	0.301
Spain	1971	1.5	2.7	4.4	5.3	7.3	9.0	11.0	13.0	16.2	23.5	0.347
Sweden	1972	2.6	4.7	6.3	7.3	9.0	10.0	11.6	13.1	16.4	18.6	0.271
United Kingdom	1973	2.4	3.7	5.3	6.9	8.5	9.9	11.1	12.9	15.4	23.9	0.327
United States	1972	1.7	3.2	4.6	6.3	7.9	9.6	11.4	13.2	16.0	26.1	0.369
Average ^a	..	2.2	3.8	5.3	6.7	8.1	9.4	10.8	12.7	15.6	25.4	
Dispersion ^b	..	0.23	0.23	0.15	0.12	0.07	0.06	0.06	0.04	0.05	0.14	

Decile shares

a) Arithmetic mean.
b) Measured by coefficient of variation.

Note: Figures have been made roughly comparable to those shown in Table 4, even when they refer to a different year.

Table 4 Revision of Japan's Income Distribution(Ishizaki, 1983)

	1	2	3	4	5	6	7	8	9	10	Gini
Size Distribution of Pre-tax income (1968)	1.2	3.5	4.9	6.0	7.2	8.5	10.2	12.0	14.6	31.9	0.408
Size Distribution Post-tax income based on "Stand- ardised" (1977)	2.7	3.8	5.2	6.4	7.4	8.7	10.3	12.5	15.7	27.3	0.361

Figure 3 Wage by Educational Level for Male Morkers (1980)

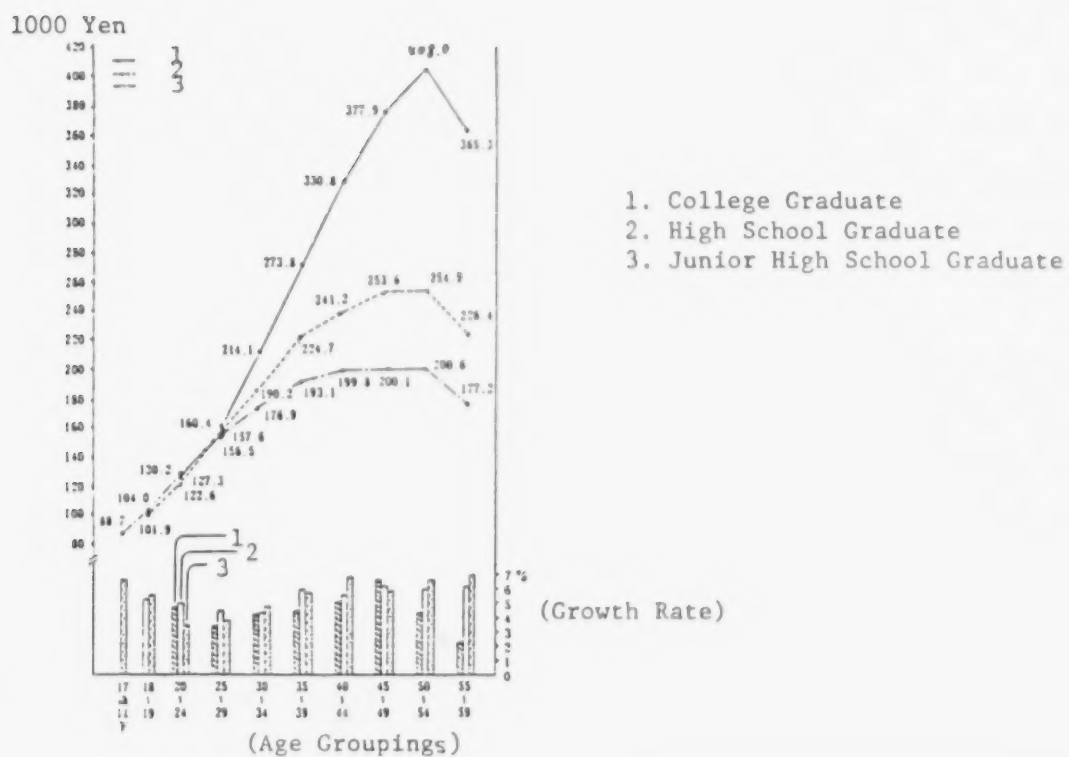


Table 5 Lifelong Wage

Year	Junior High School Graduate	High School Graduate	Junior College Graduate	College Graduate
1967	29.8 million	35.8 million	43.2 million	50.7 million yen
1968	35.6	41.4	49.5	58.7
1969	40.2	46.1	54.9	65.2
1970	47.0	53.8	66.3	76.6
1971	52.8	61.0	75.4	87.4
1972	59.6	69.0	83.9	94.5
1973	71.1	80.0	92.1	109.7
1974	88.3	100.3	115.4	134.1
1975	99.6	115.4	136.4	154.9
1976	106.2	124.5	148.3	170.7
1977	116.1	135.8	160.7	187.1
1978	122.7	143.9	166.1	197.7
1979	129.3	149.8	172.1	203.2
1980	138.9	159.5	180.1	215.4

Table 6 Current Average Growth Rate

		Average
1967- 1973	Junior High School	15.6 %
	High School	14.3
	Junior College	13.4
	College	13.7
1974- 1980	Junior High School	7.8
	High School	8.0
	Junior College	7.7
	College	8.1

-6-

Table 7 Lifelong Wage by the Size of Enterprise and Growth Rate

						Average	Major Company	Middle Level Company	Small Company
million yen									
Junior High School	Average	Major Company	Middle Level Company	Small Company	1967-1973	Junior High School	15.6 %	16.3 %	16.5 %
High School	132.9	165.2	140.1	122.7 <th>High School</th> <td>14.3</td> <td>15.6</td> <td>15.0</td>		High School	14.3	15.6	15.0
Junior College	159.5	188.9	152.0	136.2 <th>Junior College</th> <td>13.4</td> <td>12.7</td> <td>13.8</td>		Junior College	13.4	12.7	13.8
College	120.1	212.6	120.7	152.2 <th>College</th> <td>13.7</td> <td>12.3</td> <td>13.4</td>		College	13.7	12.3	13.4
College	215.4	252.4	205.2	171.4	1974-1980	Junior High School	7.8	8.6	8.0
						High School	8.0	9.0	8.0
						Junior College	7.7	9.3	8.2
						College	8.1	9.1	7.9

Table 8 Lifelong Wage by Type of Industry

	Junior High School	High School	Junior College	College
	million yen	million yen	million yen	million yen
Mining	136.8	148.2	174.7	205.0
Construction	126.1	151.7	177.5	193.8
Manufacturing	142.6	159.2	182.7	207.6
Wholesale & Retail Trade	135.6	159.7	163.1	195.9
Finance, Insurance	163.3	217.1	214.5	248.0
Real Estate	147.5	162.9	177.3	196.5
Services	129.1	149.6	179.7	233.0
Transportation & Communication	149.3	151.0	169.9	181.1
	180.2	189.1	208.4	223.9

Electricity Gas, Water, Steam and Hot Water Supply

Table 9 Distribution of Workers by Income Level and Age Group

High School Graduate	Age Group	18 20 25 30 35 40 45 50 55 60 65-															
		Total	-17	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	-84
Total		400 748	27 347	81 806	105 840	117 403	94 409	74 205	44 023	30 618	15 993	7 054	4 590				
100 0	100 0	181	16	36	26	10	7	22	21	12	9	6	10				
100 0	100 0	308	44	72	40	25	11	29	22	11	12	16	32				
100 0	100 0	861	259	253	71	53	27	23	22	29	24	44	45				
100 0	100 0	2 462	845	766	175	147	60	61	67	46	53	71	163				
100 0	100 0	8 190	3 742	3 094	503	236	106	110	83	109	213	211	177				
100 0	100 0	20 158	8 704	8 128	1 201	641	254	163	170	174	292	307	223				
100 0	100 0	29 034	7 424	14 633	3 163	972	448	371	346	297	443	447	410				
100 0	100 0	30 237	3 308	16 277	5 369	1 572	653	344	505	532	516	600	278				
170 0	170 0	66 684	2 262	22 498	23 337	7 495	2 707	2 009	1 762	1 521	1 377	850	666				
140 0	140 0	72 920	394	9 680	28 649	16 719	5 515	3 788	2 743	1 946	1 699	874	703				
100 0	100 0	77 254	194	3 361	21 763	25 157	9 621	6 003	3 870	2 640	1 411	756	641				
100 0	100 0	64 548	131	1 370	10 771	24 099	13 853	8 431	4 961	2 602	1 428	886	327				
200 0	200 0	219 0	572	5 503	14 651	15 383	9 666	5 505	2 956	1 353	555	221	211				
270 0	270 0	43 457	290	2 417	10 302	13 746	9 187	4 933	2 649	1 149	323	203	203				
240 0	240 0	35 117	219	1 131	5 993	10 923	8 539	4 539	2 572	972	261	162	162				
200 0	200 0	23 441	70	632	3 065	7 727	6 479	3 626	2 453	971	216	74	74				
200 0	200 0	10 350	71	404	1 591	4 730	3 286	3 371	1 924	767	146	66	66				
200 0	200 0	26 470	124	322	1 859	5 553	7 455	3 601	3 614	1 254	305	103	103				
210 0	210 0	12 307	3	159	479	1 805	3 345	3 935	2 129	694	144	93	93				
400 0	400 0	5 951	197	209	668	1 097	1 097	1 023	1 212	618	88	66	66				
450 0	450 0	2 730	—	—	—	111	274	519	812	250	59	33	33				
500 0	500 0	1 845	—	—	—	215	143	328	432	471	221	59	17				
600 0	600 0	636	—	—	—	4	140	121	97	146	84	22	13				
700 0 + PPS	700 0 + PPS	277	—	—	—	7	1	19	33	118	45	35	10				
1	109.7	84.1	94.7	120.0	160.7	150.5	161.0	154.2	145.4	120.6	101.1	81.5	81.5				
2	179.3	100.1	118.4	151.2	184.6	218.1	232.1	238.2	246.7	204.7	162.1	144.5	144.5				
3	268.3	122.2	155.6	200.0	245.9	296.3	336.7	377.1	369.2	297.4	238.5	238.5	238.5				
4	1.00	0.38	0.51	0.52	0.57	0.63	0.76	0.94	1.32	1.21	1.21	1.15	1.15				
5	138.0	92.2	105.3	133.4	161.2	186.0	192.4	190.9	184.4	152.5	121.3	111.4	111.4				
6	179.3	100.1	118.4	151.2	184.6	218.1	232.1	238.2	246.7	204.7	162.1	144.5	144.5				
7	229.9	109.1	135.4	175.3	213.3	255.4	278.9	302.2	310.5	277.0	215.2	189.6	189.6				
8	0.51	0.17	0.26	0.27	0.28	0.32	0.37	0.47	0.52	0.41	0.38	0.36	0.36				

College Graduate	Age Group	18 20 25 30 35 40 45 50 55 60 65-															
		Total	-17	-19	-24	-29	-34	-39	-44	-49	-54	-59	-64	-69	-74	-79	-84
Total		249 232	29 276	65 793	67 566	61 046	29 013	20 059	9 455	4 590	1 462	1 750					
100 0	100 0	26	9	9	4	2	—	2	—	—	—	—	0				
100 0	100 0	67	13	17	3	2	—	0	3	—	2	5	5				
100 0	100 0	71	14	19	16	6	—	—	—	1	7	6	6				
100 0	100 0	223	91	67	—	12	10	4	0	3	3	10	10				
100 0	100 0	457	232	116	63	15	7	9	—	3	10	22	13				
100 0	100 0	1 466	863	402	66	46	12	6	13	15	29	19	19				
100 0	100 0	4 020	3 166	1 317	147	52	6	10	10	6	46	47	47				
100 0	100 0	10 341	6 823	3 215	256	52	23	16	23	30	38	72	72				
170 0	170 0	30 451	12 407	15 790	1 419	200	117	84	104	108	100	173	173				
140 0	140 0	27 941	3 755	18 082	4 818	676	145	103	64	64	148	166	166				
100 0	100 0	23 264	1 178	11 767	9 842	1 137	263	293	108	191	80	101	101				
100 0	100 0	23 940	370	7 098	12 602	2 316	637	336	188	133	102	147	147				
200 0	200 0	22 273	146	2 171	12 210	6 370	976	422	196	233	177	146	146				
210 0	210 0	10 990	66	1 886	8 637	5 553	1 452	678	313	255	108	91	91				
240 0	240 0	16 334	40	1 016	5 786	5 980	2 175	631	284	249	126	69	69				
200 0	200 0	13 925	32	512	3 642	5 362	2 444	1 268	272	253	96	106	106				
200 0	200 0	11 271	18	289	2 116	4 126	2 652	1 166	359	220	93	68	68				
200 0	200 0	22 019	30	233	2 380	6 414	7 038	3 741	1 278	632	167	70	70				
210 0	210 0	15 235	—	135	609	2 948	5 413	3 978	1 396	552	96	87	87				
400 0	400 0	10 014	—	177	249	1 017	2 930	3 570	1 511	402	65	77	77				
450 0	450 0	6 295	—	13	166	600	1 447	2 329	1 367	401	90	73	73				
500 0	500 0	4 705	—	24	214	256	640	1 481	1 341	427	108	84	84				
600 0	600 0	1 413	—	14	35	167	206	339	370	167	47	45	45				
700 0 + PPS	700 0 + PPS	1 155	—	—	21	88	125	86	246	247	192	56	63				
1	126.1	105.3	121.6	156.7	198.4	228.0	266.3	236.7	179.6	127.4	117.2	117.2	117.2				
2	268.3	122.2	155.6	200.0	245.9	296.3	336.7	377.1	369.2	297.4	238.5	238.5	238.5				
3	349.3	154.6	206.7	276.4	364.1	441.2	511.3	575.6	576.5	524.6	544.7	544.7	544.7				
4	1.16	0.39	0.55	0.57	0.63	0.66	0.72	0.94	1.18	1.18	1.18	1.18	1.18				
5	153.7	114.3	134.3	179.3	225.8	270.7	301.4	316.4	243.7	174.2	152.4	152.4	152.4				
6	206.4	125.5	153.2	205.4	241.2	273.2	310.3	343.5	343.5	243.5	214.9	214.9	214.9				
7	266.7	137.3	177.3	237.6	308.6	382.1	441.1	485.2	485.2	382.1	342.5	342.5	342.5				
8	0.65	0.18	0.26	0.28	0.28	0.34	0.34	0.38	0.42	0.42	0.38	0.38	0.38				

1. First Decile
2. Median
3. Ninth Decile
4. Coefficient of Variance
5. First Quartile
6. Median
7. Third Quartile
8. Coefficient of Variance

Table 10 Wage Function (Kaizuka, 1979)

	$\ln(Y/H) = b_0 + b_1 \cdot s + b_2 \cdot t_1 + b_3 \cdot t_1^2$					
	b_0	b_1	b_2	b_3	R^2	S. E.
1958	-4.5348 (-41.92)	0.1054 (23.23)	0.1025 (31.59)	-0.0018 (-21.08)	0.989	0.038
1959	-4.4639 (-63.33)	0.1069 (21.51)	0.0946 (32.37)	-0.0015 (-22.25)	0.989	0.048
1960	-4.3054 (44.19)	0.0993 (20.77)	0.0910 (32.28)	-0.0014 (-22.20)	0.987	0.050
1962	-3.9485 (-67.62)	0.0970 (20.69)	0.0820 (29.43)	0.0013 (-19.83)	0.981	0.051
1963	3.8532 (-53.61)	0.0973 (16.99)	0.0818 (23.83)	-0.0012 (-16.78)	0.972	0.065
1964	-3.2370 (-59.09)	0.0816 (19.78)	0.0736 (29.68)	-0.0012 (-21.40)	0.982	0.045
1965	-2.9869 (-52.29)	0.0750 (17.47)	0.0718 (29.11)	-0.0012 (-20.84)	0.978	0.044
1966	-2.7990 (-48.82)	0.0716 (16.81)	0.0696 (27.58)	-0.0011 (-20.89)	0.975	0.046
1967	-2.5957 (-41.88)	0.0693 (15.32)	0.0675 (24.91)	-0.0011 (-19.17)	0.966	0.052
1968	-2.4504 (-39.81)	0.0701 (15.80)	0.0655 (24.42)	-0.0011 (-19.06)	0.967	0.049
1969	-2.3064 (-39.10)	0.0697 (16.75)	0.0649 (25.27)	-0.0011 (-19.95)	0.969	0.046
1970	-2.0902 (-33.52)	0.0679 (15.62)	0.0644 (24.27)	-0.0011 (-19.69)	0.950	0.057
1971	-1.8259 (-31.98)	0.0670 (17.17)	0.0627 (26.25)	-0.0011 (-21.55)	0.956	0.052
1972	-1.7449 (-32.55)	0.0693 (19.07)	0.0644 (27.13)	-0.0011 (-21.63)	0.966	0.046
1973	-1.7222 (-33.25)	0.0735 (21.28)	0.0669 (29.66)	-0.0011 (-23.19)	0.970	0.045

Y: Wage

s: Educational Level

 t_1 : Years of Work Experience

H: Working Hours per Month

Table 11 The Share of the Direct Effect of Explanatory Powers for
Japanese Income Distribution (Tachibanaki, 1975)

	1958	59	60	61	62	63	64	65	66	67	68	69	70
1	26.0	27.1	31.7	34.8	32.7	34.7	37.1	37.2	41.6	44.2	43.5	46.6	41.6
2	10.5	10.0	7.9	8.3	8.6	7.9	8.5	7.2	6.9	4.1	5.1	5.7	4.7
3	10.1	17.4	13.2	10.1	11.9	10.9	7.2	7.3	5.1	5.3	7.6	7.2	11.2
4	1.1	0.9	0.9	1.2	1.1	0.9	1.3	1.3	1.4	1.9	0.9	1.0	1.0
5	24.2	25.0	26.2	25.7	26.6	22.5	25.5	27.7	26.4	28.6	26.9	24.2	22.0
6	18.1	19.7	20.0	19.4	19.2	20.4	20.5	18.5	18.3	15.3	16.1	15.2	18.5
7	100	100	100	100	100	100	100	100	100	100	100	100	100

1. Sex
2. Occupation
3. Size of Enterprise
4. Education
5. Experience
6. Age
7. Total

Table 12 Changes in L.L. Wage According to the Discount Rate
at Various Educational Levels

	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	11 %	12 %
1	107.9	85.2	68.4	55.8	46.2	38.7	33.0	28.4	24.7	21.7	19.3	17.3
2	121.8	94.4	74.2	59.2	47.9	39.3	32.6	27.3	23.2	19.9	17.2	14.9
3	134.8	102.3	78.7	61.4	48.5	38.3	31.5	25.8	21.4	17.9	15.1	12.8
4	150.5	119.5	90.6	69.6	54.1	42.5	33.8	27.1	22.0	18.0	14.9	12.4

1. Junior High School Graduate
2. High School Graduate
3. Junior College Graduate
4. College Graduate

Figure 4 Optimum Educational Investment(Male)

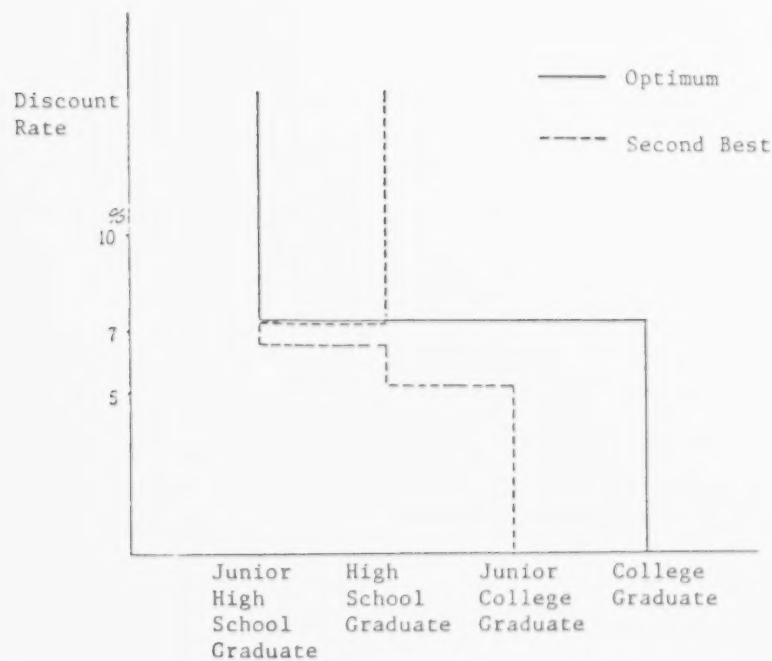


Figure 5 Optimum Educational Investment(Female)

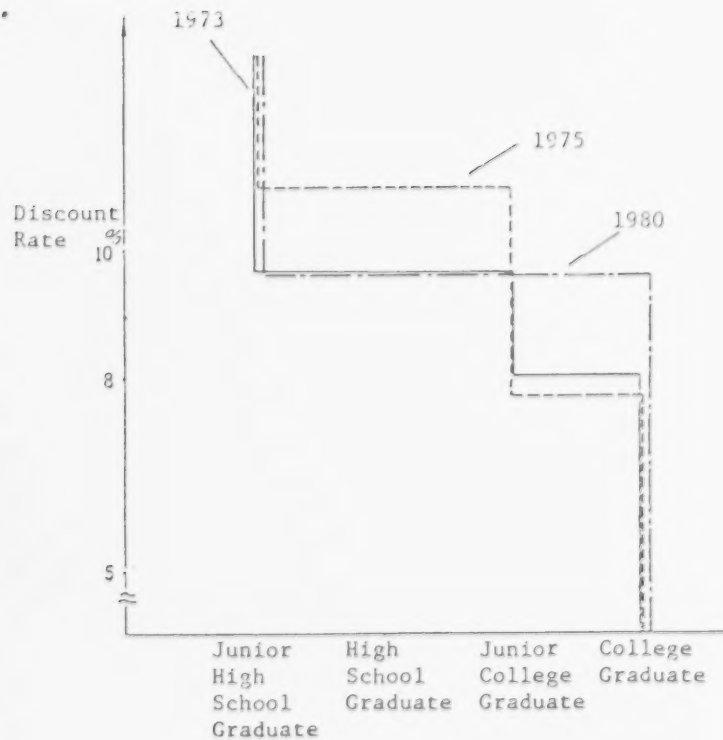


Table 13 Marginal Rate of Return

	Pre-tax Return		Post-tax Return	
	National & Public	Private	National & Public	Private
High School Graduate	6.4	6.0	6.1	5.7
Junior College Graduate	5.4	5.1	5.1	4.8
College Graduate	7.4	7.1	7.1	6.7

Table 14 Marginal Rate of Return (Opportunity Cost Only)

	High School Graduate	Junior College Graduate	College Graduate
1967	7.6 %	9.4 %	9.7 %
1968	6.7	8.0	9.5
1969	6.2	8.0	9.3
1970	5.9	8.4	9.2
1971	6.2	8.6	9.3
1972	6.4	8.7	8.7
1973	6.4	6.1	8.0
1974	5.7	6.3	7.9
1975	6.4	7.1	8.0
1976	7.2	7.1	8.2
1977	7.0	7.3	8.2
1978	7.2	6.2	8.2
1979	6.7	6.2	8.0
1980	6.6	5.6	7.9

Table 15 Percent of Male workers not Transferring
(over 25 years old) in Manufacturing (E.P.A., 1985)

		Size of Enterprise					%
		30~34 years old	35~39	40~44	45~49	50~54	
1949-1953	1	83.3	—	—	—	—	
	2	96.1	—	—	—	—	
	3	84.4	—	—	—	—	
	4	61.7	—	—	—	—	
		(58)	—	—	—	—	
1944-1948	1	83.5	75.5	—	—	—	
	2	94.5	93.2	—	—	—	
	3	83.9	76.0	—	—	—	
	4	64.5	49.4	—	—	—	
		(53)	(58)	—	—	—	
1939-1943	1	79.4	69.3	64.5	—	—	
	2	90.2	85.2	84.9	—	—	
	3	74.0	67.4	62.4	—	—	
	4	58.5	46.3	37.6	—	—	
		(48)	(53)	(58)	—	—	
1934-1938	1	72.5	62.7	54.4	51.8	—	
	2	85.0	74.9	74.3	75.0	—	
	3	71.2	56.7	51.2	50.5	—	
	4	57.0	39.7	32.7	27.2	—	
		(43)	(48)	(53)	(58)	—	
1929-1933	1	—	54.2	54.5	42.2	38.8	
	2	—	74.0	75.1	66.0	65.5	
	3	—	47.1	47.9	36.7	35.1	
	4	—	33.4	22.5	20.4	16.6	
		—	(43)	(48)	(53)	(58)	

- 1.Total
- 2.Major Company
- 3.Middle Level Company
- 4.Small Company

Table 16 Employment of College Graduate by Size of Company and Type of Institution (Amano, 1978)

(%)

Type of Institution	Size of Company						
	I	II	III	IV	V	VI	
National I	3.1	7.1	5.6	23.9	46.4	14.0	100
Private I	3.0	7.1	7.2	34.1	43.9	4.7	100
National II	5.3	13.1	8.4	24.9	33.5	14.3	100
National III	8.6	19.6	10.9	25.4	21.5	14.0	100
Private II	6.5	21.2	13.3	30.3	16.5	11.2	100
Private III	15.4	28.9	12.6	18.3	8.7	16.1	100

Size of Company

- I : less than 99
 II : 100—499
 III : 500—999
 IV : 1000—4999
 V : more than 5000
 VI : Government employee

Type of Institution

- National I : Old 7 imperial universities
 National II : Prestigious national universities
 National III : Less prestigious national universities
 Private I : Waseda and Keio universities
 Private II : Old private universities
 Private III : New private universities

Table 17 Differences in the Rate of Return

		High School Graduate	College Graduate
		Rate of Return	Rate of Return
Total	1	6.6%	7.9%
	2	11.3	10.3
	3	5.8	6.5
	4	*	2.7
Mining	1	3.9	6.8
	2	9.7	8.0
	3	4.8	6.4
	4	*	3.7
Construction	1	4.9	6.0
	2	11.5	8.3
	3	6.0	4.9
	4	*	*
Manufacturing	1	6.8	7.3
	2	10.4	9.6
	3	5.9	5.6
	4	*	*
Wholesale & Retail Trade	1	5.9	6.3
	2	11.2	9.9
	3	6.7	4.5
	4	1.4	1.2
Finance, Insurance	1	13.9	11.8
	2	15.6	13.0
	3	10.5	7.8
	4	7.9	7.1
Real Estate	1	7.5	7.5
	2	12.6	11.7
	3	8.3	8.1
	4	4.9	3.1
Service	1	4.1	8.7
	2	10.1	10.9
	3	4.7	8.9
	4	*	5.5
Transportation & Communication	1	3.8	4.9
	2	5.2	6.4
	3	3.9	4.0
	4	*	*
Electricity Gas Water, Steam and Hot Water Supply	1	10.0	8.3
	2	10.7	-
	3	8.1	6.6
	4	6.0	4.6

1. Total
2. Major Company
3. Middle Level Company
4. Small Company

Table 18 Expected Rate of Return by Type of Institution

Type of Institution		Expected Rate of Return
National & Public	National I	9 . 5%
	National II	8 . 6
	National III	8 . 2
	Total	8 . 7
Private	Private I	9 . 5
	Private II	8 . 2
	Private III	7 . 0
	Total	8 . 0

Table 19 Factors Determining the Applicant Rate

	YZ-1	P-1	GO-1	OIL	R	D.W
Jr. College and College	0.2240 (15.4)	-0.0222 (-2.58)	0.4981 (8.50)	3.554 (7.47)	0.992	1.85
College	0.1615 (14.3)	-0.0239 (-3.47)	0.3239 (8.42)	2.479 (6.56)	0.986	1.87
Male College	0.2445 (17.5)	-0.0347 (-4.37)	0.4875 (9.29)	3.440 (8.19)	0.986	2.81
Female College	0.1201 (10.78)	-0.0172 (-2.45)	0.2356 (4.49)	1.5103 (4.49)	0.970	1.83
Female Junior College	0.1950 (7.34)	-0.0250 (-1.51)	-0.1097 (-0.76)	2.04 (6.53)	0.987	2.21

YZ-1 : Miscellaneous Expenditure (1 year time lag)
P-1 : Price of Education (1 year time lag)
GO-1 : Success Ratio (1 year time lag)
OIL : Dummy Variable for Energy Crisis : 1 = 1975-78

Table 20 Estimated University Enrollment Ratios by Family
Income Quintile Groups, 1961-1976 (Adjusted to
Age Groups of Household Head) (Kikuchi, 1978)

	year	I	II	III	IV	V
National Universi- ties	1961	1.9	2.5	2.2	2.5	3.0
	1963	2.9	3.1	2.2	2.6	3.4
	1965	3.1	2.8	2.8	2.6	2.7
	1968	3.1	2.4	2.4	2.9	2.8
	1970	4.0	3.3	3.4	2.9	3.5
	1972	5.5	4.9	2.9	3.1	3.7
	1974	3.9	3.2	3.7	4.6	5.5
	1976	4.3	4.2	4.3	5.1	6.2
Private Univer- sities	1961	1.2	1.8	2.3	4.4	11.3
	1963	3.0	3.6	3.6	6.0	14.2
	1965	2.7	3.7	4.9	7.1	15.9
	1968	2.3	3.3	4.9	9.5	18.2
	1970	4.7	5.1	9.2	11.0	21.8
	1972	9.1	13.7	10.7	13.4	25.0
	1974	6.8	7.7	11.1	16.4	36.0
	1976	8.2	11.2	13.0	22.7	38.2

Figure 6 The Cost = Rate of Return Curve

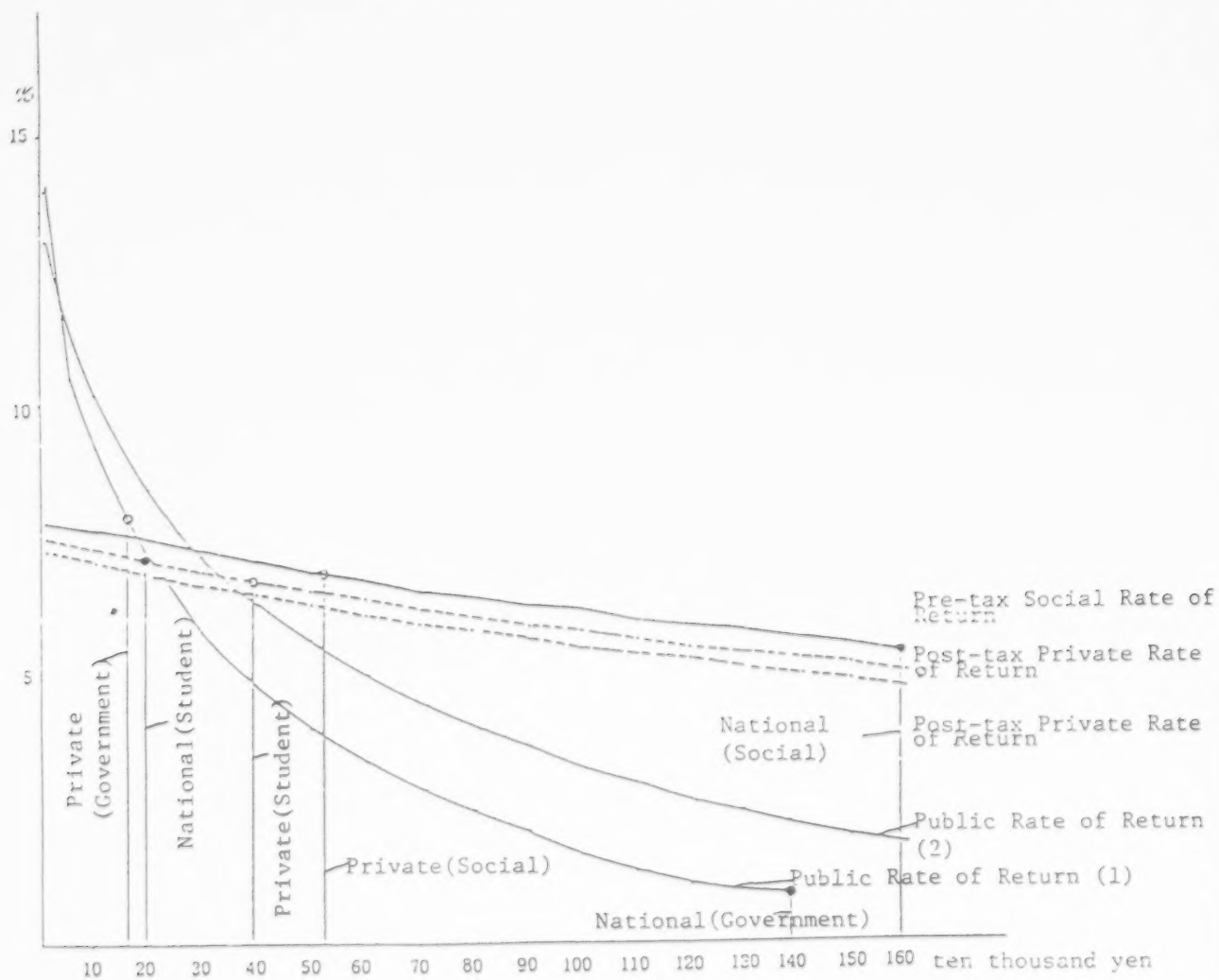


Table 21 Social, Private, Public Rate of Return (1980)

		Social Rate of Return	Private Rate of Re- turn		Public Rate of Return	
			I	II	I	II
High School	Public	5.5 %	6.1 %	5.9 %	1.7 %	3.4 %
	Private	5.7	5.7	5.5	5.2	6.8
Junior College	National	4.7	5.1	5.0	2.3	3.6
	Private	4.9	4.8	4.7	6.0	6.7
University	National	5.4	7.1	6.9	*	2.3
	Private	6.5	6.7	6.5	7.7	8.9

Note; I; Income Tax, II; Income Tax + Other Taxes